INFORMATION PAPER

Military Vaccine Agency 6 January 2005

SUBJECT: Tuberculosis, Tuberculin Skin Test, and BCG Vaccine

1. Purpose. To describe tuberculosis, the skin test to detect it, and the vaccine occasionally used to prevent it.

2. Facts.

a. Microbiology. Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis*. These bacteria usually invade the lungs, although they can be found anywhere in the body. There are two main forms of TB: latent TB infection and TB disease. People who have latent TB infection, but not TB disease, have inactive *M. tuberculosis* bacteria in their bodies. These people are not sick with TB today, but they may develop TB disease sometime in the future. People with actual TB disease are sick from *M. tuberculosis* bacteria actively reproducing in their bodies. Symptoms of TB disease include fatigue, cough, weight loss, fever, and night sweats.

b. Epidemiology. TB spreads from person to person via airborne respiratory droplets. The bacteria are transmitted when people with active TB bacteria in their lungs or larynxes cough, talk, sneeze, or sing. Prolonged, close exposure to a person with active TB is usually needed to spread the bacteria, so family, friends and coworkers are at risk.

c. Tuberculosis Skin Test. The tuberculin skin test (TST, also called the Mantoux test) involves an injection of 0.1-mL of the purified protein derivative (PPD) of tuberculin (*Tubersol*, Aventis Pasteur) just under the skin (intradermally). PPD is a sterile solution of TB protein. A positive test 48 to 72 hours after injection helps to diagnose infection with *Mycobacterium tuberculosis*. PPD is not a vaccine; it is a skin-test reagent used to screen for people infected with TB bacteria. The size of the PPD skin test reaction indicates whether the person is infected. The reaction size that is defined as positive varies, depending on the patient's risk factors for TB infection. People who develop a positive PPD test generally should not receive PPD again, but should receive thorough testing for tuberculosis infection (e.g., chest x-rays).

d. Tuberculin Testing. Health care providers administer PPD intradermally, just under the surface of the skin. The dose is 5 U.S. tuberculin units (TU) per 0.1 mL. A healthcare professional interprets the injection site 48 to 72 hours later. Adults previously vaccinated with a product called BCG can be given a PPD skin test, but BCG vaccination may cause a positive reaction to PPD. Test people who are HIV-infected for TB infection as recommended by the Advisory Council for the Elimination of Tuberculosis.

e. Cautions—Tuberculin. Do not inject PPD subcutaneously or intramuscularly, because no local reaction would develop and the result could be falsely negative. Another potential cause of false-negative tuberculin tests occurs when cell-mediated immunity (CMI) is reduced by immune suppression (e.g., AIDS), severe protein malnutrition, lymphoma, leukemia, or sarcoidosis. Prolonged use of corticosteroids and other immune-suppressant drugs or recent receipt of live virus vaccinations may also affect TST interpretation.

f. Adverse Events After Tuberculin Testing. Injection-site adverse reactions to PPD are rare. Blistering, ulceration, or necrosis may develop at the test site in highly sensitive people. To provide relief, apply cold packs and topical steroid preparations. Strongly positive reactions may leave a scar at the test site. Systemic reactions occur extremely rarely. These manifest as skin rashes or a generalized rash within 24 hours.

g. Tuberculosis Vaccine. Bacille Calmette-Guerin (BCG), a live bacterial vaccine (*Tice BCG*, Organon Teknika) made from a weakened strain of *Mycobacterium bovis*, is used in developing countries to reduce complications of TB in infants and children. The efficacy of this drug in adults varies and it is not normally recommended for use in the United States. In specific circumstances, it may be used in the United States to treat urinary bladder cancer.

h. Immunization. BCG vaccination to prevent TB is reserved for people who meet specific criteria. BCG vaccination considered for a child continuously exposed to an ineffectively treated patient infected with *M. tuberculosis*. BCG vaccination is not recommended for children infected with HIV. Consider BCG vaccination of healthcare workers who care for TB patients infected with *M. tuberculosis* strains resistant to isoniazid and rifampin and where transmission to the healthcare workers is likely. Also, consider vaccination of healthcare workers where comprehensive TB infection-control precautions have been implemented but have not proven successful. BCG vaccination is not recommended for healthcare workers who are infected with HIV or who are otherwise immune compromised.

i. DoD Policy. See service-specific policies and directives.
Army: chppm-www.apgea.army.mil/news/LTBIMemo27May03.pdf
Air Force: www.e-publishing.af.mil/pubfiles/af/48/afi48-115/afi48-115.pdf
Navy: www-nehc.med.navy.mil/nepmu2/pmttoolbox/IMMUNIZATIONS1_files/Instructions & Notices/BUMEDINST 6224.8 CH-1.pdf
www-nehc.med.navy.mil/nepmu2/pmttoolbox/IMMUNIZATIONS1_files/Immunization%20Messages/TB%20clar%204-01%20241350Z.txt

j. Special Considerations. People who travel and come in contact on a regular basis with those in hospitals, prisons, or homeless shelters should have a TST before leaving the United States and upon return. Immune-compromised people (e.g., those with

AIDS) may have a reduced response to PPD; therefore, immune-compromised travelers should advise their physicians of their health status.

3. References.

a. CDC. Progressing toward tuberculosis elimination in low-incidence areas of the United States: Recommendations of the Advisory Council for the Elimination of Tuberculosis. *MMWR* 2002;51(RR-5):1-14. www.cdc.gov/mmwr/PDF/RR/RR5105.pdf

b. Advisory Committee on Immunization Practices, Advisory Council for the Elimination of Tuberculosis. The role of BCG vaccine in the prevention and control of tuberculosis in the United States. *MMWR* 1996;45(RR-4):1-18. ftp.cdc.gov/pub/Publications/mmwr/rr/rr4504.pdf

c. CDC disease information. www.cdc.gov/nchstp/tb/faqs/qa.htm

d. American Thoracic Society, CDC, Infectious Diseases Society of America. Treatment of tuberculosis. *MMWR* 2003;52(Jun 20)(RR-11). www.cdc.gov/mmwr/PDF/RR/RR5211.pdf

e. National Center for Infectious Diseases Travelers' Health. www.cdc.gov/travel/diseases/tb.htm

f. Deployment Health Clinical Center, TB resources. www.deploymenthealth.mil/tuberculosis.asp

g. Package Inserts:
Tubersol: www.vaccineshoppe.com/US_PDF/752-21_4611.pdf
BCG vaccine: www.ticebcg.com

Approved by COL Grabenstein